	Application No.	Applicant(s)
Notice of Allowability	09/654,401	PAVLOVIC ET AL.
	Examiner	Art Unit	
	Herng-der Day	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *Amendments received 6/24/05 and 8/18/05*.

2. ☒ The allowed claim(s) is/are *1-27, 29-64, and 66-74, now renumbered as 1-72*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None   of the:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

        3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the
            International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of
        Paper No./Mail Date _____ .

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
    Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit
    of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☒ Interview Summary (PTO-413),
    Paper No./Mail Date *09152005* .

7. ☐ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

DETAILED ACTION

1.   This communication is in response to Applicants' Amendment to Office Action dated

March 22, 2005, mailed June 22, 2005, received by PTO June 24, 2005, and Applicants'

Supplemental Amendment faxed August 18, 2005.

1-1.   Claims 1, 16, 26-27, 29, 44, 46, 52, 54, 58, 62-63, 66, 70, and 74 have been amended.

Claims 28 and 65 have been cancelled. Claims 1-27, 29-64, and 66-74 are pending.

1-2.   Claims 1-27, 29-64, and 66-74 have been examined and allowed.

Reasons for Allowance

2.   The following is an Examiner's statement of reasons for allowance:

2-1.   The closest prior art of record discloses:

(1) Using tractable variational approximations to learn model parameters by maximizing

a lower bound on the likelihood (Ghahramani, "Learning Dynamic Bayesian Networks").

(2) A mixed-state dynamic graphical model in which a HMM drives a linear dynamic

system (Pavlovic et al., "Variational Learning in Mixed-State Dynamic Graphical Models");

(3) An inference algorithm utilizing compactly represented approximate belief states

(Boyen et al., "Tractable Inference for Complex Stochastic Processes").

2-2.   Independent claim 1 is directed at a computer implemented method for synthesizing a

data sequence representing figure or human motion. Although using tractable variational

approximations to learn model parameters is obvious as disclosed in Ghahramani's article, this

independent claim identifies the distinct combination of features of "determining and recording,

for a given measurement and for each possible switching state, an optimal prior switching state,

based on the at least one training sequence, wherein the optimal prior switching state optimizes a

transition probability", "determining the sequence of switching states by backtracking, from said

optimal final switching state, through the state transition record", "learning parameters of the

dynamic models, responsive to the determined sequence of switching states", and "synthesizing a

new data sequence, based on the dynamic models with learned parameters", as shown in Figs. 3,

4A and 4B, which has not been uncovered in a single teaching, nor would a modification of prior

art references be obvious to one of ordinary skill in the art to yield these limitations in the

context of the claim. Claim 1 is deemed allowable.

Dependent claims 2-21 are allowable as they depend on the allowed independent claim 1.

2-3.   Claims 22-24 are computer apparatus claims including equivalent method limitations as

in the allowable claims 1-3 respectively and are deemed allowable for the same reasons as claims

1-3.

2-4.   Independent claims 25-27 are computer system, product, and system claims respectively

including equivalent method limitations as in the allowable claim 1 and are deemed allowable for

the same reason as claim 1.

2-5.   Independent claim 29 is directed at a computer implemented method for synthesizing a

data sequence representing figure or human motion. Although using tractable variational

approximations to learn model parameters is obvious as disclosed in Ghahramani's article, this

independent claim identifies the distinct combination of features of "decoupling the dynamic

models from the switching model", "determining parameters of a decoupled dynamic model",

"determining parameters of the decoupled switching model", "estimating a probability for each

possible switching state", "determining a switching state sequence", "learning parameters of the

dynamic models, responsive to the switching states sequence", and "synthesizing a new data

sequence, based on the dynamic models with learned parameters", as shown in Figs. 5-7, which

has not been uncovered in a single teaching, nor would a modification of prior art references be

obvious to one of ordinary skill in the art to yield these limitations in the context of the claim.

Claim 29 is deemed allowable.

Dependent claims 30-45 are allowable as they depend on the allowed independent claim

29.

2-6.   Independent claim 46 is directed at a computer apparatus for motion synthesis and

interpolation using a switching linear dynamic system (SLDS) model. Although using tractable

variational approximations to learn model parameters is obvious as disclosed in Ghahramani's

article, this independent claim identifies the distinct combination of features of "an approximate

variational state sequence inference module, which reestimates parameters of each LDS model,

using variational inference, to minimize a modeling cost of current state sequence estimates,

responsive to at least one training sequence of measurements", and "a synthesizer which

synthesizes a new data sequence, based on the reestimated LDS models", as shown in Fig. 5,

which has not been uncovered in a single teaching, nor would a modification of prior art

references be obvious to one of ordinary skill in the art to yield these limitations in the context of

the claim. Claim 46 is deemed allowable.

Dependent claims 47-53 are allowable as they depend on the allowed independent claim

46.

2-7.   Independent claim 54 is directed at a computer implemented method for synthesizing

figure motion by interpolating from an input measurement sequence. Although using tractable

variational approximations to learn model parameters is obvious as disclosed in Ghahramani's

article, this independent claim identifies the distinct combination of features of "determining and

recording, for a given measurement and for each possible switching state, an optimal prior switching state, based on the at least one training measurement sequence, wherein the optimal prior switching state optimizes a transition probability", "determining the sequence of switching states by backtracking, from said optimal final switching state, through the state transition record", "determining the sequence of continuous states based on the determined sequence of switching states", and "interpolating missing motion data from the input measurement sequence, based on dynamic models and responsive to the determined sequences of continuous and switching states", as shown in Fig. 20, which has not been uncovered in a single teaching, nor would a modification of prior art references be obvious to one of ordinary skill in the art to yield these limitations in the context of the claim. Claim 54 is deemed allowable.

Dependent claims 55-60 are allowable as they depend on the allowed independent claim 54.

2-8.   Independent claims 61-64 are computer apparatus, system, product, and system claims respectively including equivalent method limitations as in the allowable claim 54 and are deemed allowable for the same reason as claim 54.

2-9.   Independent claim 66 is directed at a computer implemented method for synthesizing motion by interpolating from an input measurement sequence. Although using tractable variational approximations to learn model parameters is obvious as disclosed in Ghahramani's article, this independent claim identifies the distinct combination of features of "decoupling the dynamic models from the switching model", "determining parameters of a decoupled dynamic model", "determining parameters of the decoupled switching model", "estimating a probability for each possible switching state", "determining the sequence of switching state", "learning parameters of the dynamic models, responsive to the determined sequence of switching states",

and "interpolating missing motion data from the input measurement sequence, based on the

dynamic models with learned parameters", as shown in Figs. 5-7, which has not been uncovered

in a single teaching, nor would a modification of prior art references be obvious to one of

ordinary skill in the art to yield these limitations in the context of the claim. Claim 66 is deemed

allowable.

Dependent claims 67-73 are allowable as they depend on the allowed independent claim

66.

2-10.   Independent claim 74 is directed at a computer apparatus for motion synthesis and

interpolation using a switching linear dynamic system (SLDS) model. Although using tractable

variational approximations to learn model parameters is obvious as disclosed in Ghahramani's

article, this independent claim identifies the distinct combination of features of "an approximate

variational state sequence inference module, which reestimates parameters of each LDS model,

using variational inference, to minimize a modeling cost of current state sequence estimates", "a

dynamic model learner which learns parameters of the LDS models responsive to determined

sequence of switching states resulting from at least one training sequence", and "an interpolator

which interpolates missing motion data from an input sequence, based on the dynamic models

with learned parameters", as shown in Fig. 5, which has not been uncovered in a single teaching,

nor would a modification of prior art references be obvious to one of ordinary skill in the art to

yield these limitations in the context of the claim. Claim 74 is deemed allowable.

3.   Any comments considered necessary by applicant must be submitted no later than the

payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for

Allowance."

Conclusion

4.   Any inquiry concerning this communication or earlier communications from the

Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The

Examiner can normally be reached on 9:00 - 17:30.

Any inquiry of a general nature or relating to the status of this application should be

directed to the TC 2100 Group receptionist: (571) 272-2100.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's

supervisor, Jean R. Homere can be reached on (571) 272-3780. The fax phone numbers for the

organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private

PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Herng-der Day   ꓶ.Ɗ.
September 15, 2005

JEAN R. HOMERE
PRIMARY EXAMINER